

Claims

- [c1] 1. An aircraft comprising:
at least one airfoil having a leading edge and a trailing edge; and
a plurality of pulse detonation engines distributed along one of said leading and trailing edges of said airfoil and positioned beneath said airfoil, each pulse detonation engine being adapted for impulsively detonating a fuel/oxidizer mixture to generate a thrust force and to apply the thrust force to said aircraft, wherein at least one of said pulse detonation engines is movably configured for altering a direction of the thrust force relative to said airfoil.
- [c2] 2. The aircraft of Claim 1, wherein said pulse detonation engines are distributed along said leading edge of said airfoil.
- [c3] 3. The aircraft of Claim 2, further comprising:
a plurality of rear pulse detonation engines; and
at least one flap attached to said airfoil along said trailing edge of said airfoil, wherein each rear pulse detonation engine is adapted for impulsively detonating a fuel/oxidizer mixture to generate a thrust force and to apply the thrust force to said flap, and wherein said flap is movably configured to alter a direction of the thrust forces relative to said airfoil, and said rear pulse detonation engines are distributed along said flap.
- [c4] 4. The aircraft of Claim 2, wherein each of said pulse detonation engines is movably configured for altering a direction of the thrust force relative to said airfoil.
- [c5] 5. The aircraft of Claim 1, wherein said pulse detonation engines are distributed along said trailing edge of said airfoil, and wherein at least one of said pulse detonation engines comprises a PDE flap, said PDE flap being movably configured to alter the direction of the thrust force relative to said airfoil.
- [c6] 6. The aircraft of Claim 1, wherein at least two of said pulse detonation engines are configured to impulsively detonate the fuel/oxidizer mixtures out of phase.
- [c7] 7. The aircraft of Claim 6, further comprising a plurality of connectors, each of said connectors being configured to connect two of said pulse detonation

engines to facilitate cross-fire initiation between said two pulse detonation engines.

- [c8] 8.The aircraft of Claim 1, further comprising a control means for selectively activating and deactivating at least one of said pulse detonation engines.
- [c9] 9.The aircraft of Claim 8, wherein said control means is configured for selectively activating and deactivating each of said pulse detonation engines.
- [c10] 10.The aircraft of Claim 1, comprising at least two airfoils, each airfoil having a leading edge and a trailing edge, wherein said pulse detonation engines are distributed along one of said leading and trailing edges of each of said airfoils and are positioned below each of said airfoils.
- [c11] 11.The aircraft of claim 10, wherein said pulse detonation engines are distributed along said trailing edges of said airfoils, and wherein at least one of said pulse detonation engines comprises a PDE flap, said PDE flap being movably configured to alter the direction of the thrust force relative to said respective airfoil.
- [c12] 12.The aircraft of Claim 11, further comprising a control means for selectively activating and deactivating at least one of said pulse detonation engines on each of said airfoils.
- [c13] 13.The aircraft of Claim 10, wherein said pulse detonation engines are distributed along said leading edge of each of said airfoils.
- [c14] 14.The aircraft of Claim 13, further comprising:
a plurality of rear pulse detonation engines; and
at least two flaps, each of said flaps being attached to a respective one of said airfoils along said trailing edge of the respective one of said airfoils,
wherein each of said flaps is movably configured to alter a direction of the thrust forces relative to the respective one of said airfoils, and wherein said rear pulse detonation engines are distributed along said flaps.
- [c15] 15.The aircraft of Claim 13, further comprising a control means for selectively activating and deactivating at least one of said pulse detonation engines on

each of said airfoils,
wherein each of said pulse detonation engines is movably configured for
altering a direction of the thrust force relative to the respective one of said
airfoils.

- [c16] 16.The aircraft of Claim 1, wherein each of said pulse detonation engines
comprises an inlet for receiving oxidizer, an outlet for exhausting an exhaust
flow, and a PDE body extending between said inlet and said outlet, wherein at
least one of said inlet and said outlet has an elliptical cross-sectional area with
a semi-major axis oriented along said airfoil.
- [c17] 17.The aircraft of Claim 16, wherein said PDE body has a cross-sectional area
that increases from a smaller cross-sectional area at said inlet to a larger cross-
sectional area at said outlet.
- [c18] 18.The aircraft of Claim 16, wherein each of said inlet and said outlet have an
elliptical cross-sectional area with the semi-major axis oriented along said
airfoil.
- [c19] 19.The aircraft of Claim 1, wherein each of said pulse detonation engines
comprises an inlet for receiving oxidizer, an outlet for exhausting an exhaust
flow, and a PDE body extending between said inlet and said outlet, wherein said
PDE body has a cross-sectional area that decreases from a larger cross-
sectional area at said inlet to a smaller cross-sectional area at said outlet.
- [c20] 20.The aircraft of Claim 1, further comprising a plurality of separators
extending from said airfoil and beneath said airfoil, each of said separators
being in intimate contact with at least one of said pulse detonation engines, and
at least one of said separators being in intimate contact with two of said pulse
detonation engines.
- [c21] 21.An aircraft comprising:
at least one airfoil having a leading edge and a trailing edge;
a plurality of pulse detonation engines distributed along said trailing edge of
said airfoil and positioned beneath said airfoil, each pulse detonation engine
being adapted for impulsively detonating a fuel/oxidizer mixture to generate a

thrust force and to apply the thrust force to said aircraft,
wherein at least one of said pulse detonation engines comprises a PDE flap, said
PDE flap being movably configured to alter the direction of the thrust force
relative to said airfoil.

[c22] 22.The aircraft of Claim 21, wherein each of said pulse detonation engines
comprises a PDE flap.

[c23] 23.The aircraft of Claim 22, wherein at least two of said pulse detonation
engines are configured to impulsively detonate the fuel/oxidizer mixtures out
of phase.

[c24] 24.The aircraft of Claim 23, further comprising a plurality of connectors, each of
said connectors being configured to connect two of said pulse detonation
engines to facilitate cross-fire initiation between said two pulse detonation
engines.

[c25] 25.The aircraft of Claim 22, further comprising a control means for selectively
activating and deactivating at least one of said pulse detonation engines.

[c26] 26.An aircraft comprising:
at least one airfoil having a leading edge and a trailing edge; and
a plurality of pulse detonation engines distributed along said leading edge of
said airfoil and positioned beneath said airfoil, each pulse detonation engine
being adapted for impulsively detonating a fuel/oxidizer mixture to generate a
thrust force and to apply the thrust force to said aircraft, wherein at least one of
said pulse detonation engines is movably configured for altering a direction of
the thrust force relative to said airfoil; and
a control means for selectively activating and deactivating at least one of said
pulse detonation engines.

[c27] 27.The aircraft of Claim 26, wherein each of said pulse detonation engines is
movably configured for altering a direction of the thrust force relative to said
airfoil, and wherein said control means is configured for selectively activating
and deactivating each of said pulse detonation engines.

- [c28] 28.The aircraft of Claim 26, wherein at least two of said pulse detonation engines are configured to impulsively detonate the fuel/oxidizer mixtures out of phase.
- [c29] 29.The aircraft of Claim 26, comprising at least two airfoils, each airfoil having a leading edge and a trailing edge, wherein said pulse detonation engines are distributed along said leading edge of each of said airfoils and are positioned below each of said airfoils.
- [c30] 30.A detonative engine comprising a plurality of pulse detonation engines arranged in a packed configuration, wherein at least one of said pulse detonation engines is hexagonal, and wherein said pulse detonation engines are packed in a honeycomb arrangement.
- [c31] 31.The detonative engine of Claim 29, wherein said pulse detonation engines share an inlet and an outlet.